Search strategy

No.	Database	Search term	Info added since	Results
2	INZZ	bandwidth	unrestricted	88447
3	INZZ	allocat$4 OR reserv$6 OR manag$6 OR aggreg$6	unrestricted	469533
4	INZZ	MPLS	unrestricted	1186
8	INZZ	2 NEAR 3	unrestricted	5383
9	INZZ	4 AND 8	unrestricted	106

Saved: 28-Jul-2004, 17:13:46 CET

DataStar Web

Documents

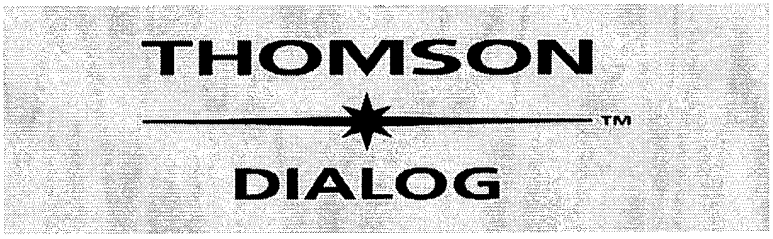

Table of Contents

Minimizing re-routing in *MPLS* networks with preemption-aware constraint-based routing.

Accession number & update

7547675, B2003-04-6150P-015, C2003-04-5640-035; 20030310.

Author(s)

Szviatovszki-B; Szentesi-A; Juttner-A; Ed. by Obaidat-M-S; Davoli-F.

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Traffic Anal & Network Performance Lab, Ericsson Res, Budapest, Hungary.

Source

Proceedings of 2001 International Symposium on Performance Evaluation of Computer and Telecommunication Systems, Orlando, FL, USA, 15-19 July 2001.
Sponsors: Soc. Modeling & Simulation Int.
In: p.249-61, 2001.

ISSN

ISBN: 1-56555-240-7.

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

The effect of distributed constrained shortest path first (CSPF) based path selection on the dynamics of label switched paths (LSP) preemption is analyzed. New CSPF algorithms for minimizing preemption of lower priority LSPs are proposed to enhance the stability of multi-priority Multiprotocol Label Switching ***(MPLS)*** networks without requiring any enhancements to the recently proposed link-state parameters. Since exact methods cannot be developed in distributed environments, different polynomial heuristic solutions for the preemption minimization problem are provided. The difference between priority-based path selection methods and previously proposed CSPF methods lies in the way the selection is done among equal cost shortest paths. The priority-aware CSPF algorithms decrease the number of preempted lower priority LSPs, resulting in less re-routing, while the LSP setup success ratio is basically the same for all methods. (24 refs).

Descriptors

bandwidth-allocation; constraint-theory; minimisation; multiprotocol- label-switching; routing-protocols; telecommunication-congestion-control; telecommunication-network-routing; telecommunication-traffic.

Keywords

constrained shortest path first algorithm; multiprotocol label switching networks; path selection algorithm; label switched paths; priority levels; preemption; ***bandwidth;*** rerouting; LSP; ***MPLS*** networks; CSPF algorithm; admission control; traffic engineering; constraint based routing.

Classification codes

B6150P (Communication network design, planning and routing).
B6150M (Protocols).
B6150C (Communication switching).
C5640 (Protocols).

Multi-constrained path computation for traffic engineering in *MPLS* networks.

Accession number & update

7547674, B2003-04-6150P-014, C2003-04-5640-034; 20030310.

Author(s)

Banerjee-G; Sidhu-D; Ed. by Obaidat-M-S; Davoli-F.

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Source

Proceedings of 2001 International Symposium on Performance Evaluation of Computer and Telecommunication Systems, Orlando, FL, USA, 15-19 July 2001.
Sponsors: Soc. Modeling & Simulation Int.
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ISSN

ISBN: 1-56555-240-7.

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

There is a need to develop sophisticated path selection algorithms which deviate from the shortest-path routing philosophy in traditional IP networks. To address this need, a traffic engineering (TE) path selection algorithm that selects paths based on ***bandwidth*** and delay constraints and additionally tries to maintain traffic engineering objectives has been developed. Called LC-DCB (Least Critical-Delay Cost ***Bandwidth)*** algorithm, it has been proven to achieve performance benefits in terms of both ***bandwidth*** blocking and load distribution when compared to two other existing multi-constrained path computation algorithms. It has also been found to maintain network costs within 5% of the optimal cost under high load conditions. Based on these results, LC-DCB qualifies as an efficient TE multi-constrained path computation algorithm. (14 refs).

Descriptors

bandwidth-allocation; delays; multiprotocol-label-switching; quality- of-service; routing-protocols; telecommunication-congestion-control; telecommunication-network-routing; telecommunication-traffic.

Keywords

multiconstrained path computation algorithm; traffic engineering; ***bandwidth;*** delay; QoS; LC DCB; TAMCRA; ***MPLS*** networks; quality of service; Least Critical Delay Cost ***Bandwidth.***

Classification codes

```
B6150P    (Communication network design, planning and routing).
B6150M    (Protocols).
B6150C    (Communication switching).
C5640     (Protocols).
```

Copyright statement

Dynamic resource *allocation* in *QoS-enabled/MPLS* supported virtual private networks and its Linux based implementation.

Accession number & update

7467611, B2003-01-6150M-042, C2003-01-5640-033; 20021202.

Author(s)

Yuxiao-Jia; Guerrero-M-L; Kabranov-O; Makrakis-D; Barbosa-L-O; Ed. by Kinsner-W; Sebak-A; Ferens-K.

Sch of Inf Technol & Eng, Ottawa Univ, Ont, Canada.

Source

IEEE CCECE2002. Canadian Conference on Electrical and Computer Engineering. Conference Proceedings, vol.3, Winnipeg, Man., Canada, 12–15 May 2002.
Sponsors: Dept. Electr. & Comput. Eng., Faculty of Graduate Studies, Faculty of Eng., TRLabs, Internet Innovation Centre, NRC Inst. Biodiagnostics, APEGM, IEEE Winnipeg Sec., IEEE Canada & IEEE, Manitoba Hydro, Vansco Electron., Bristol Aerosp., Nygard Int., Norsat.
In: p.1448–54 vol.3, 2002.

ISSN

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Publication year

2002.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical; X Experimental.

Abstract

This paper describes a proposal for the support of quality of service over virtual private networks (VPN). We combine DiffServ, ***MPLS*** and a dynamic resource ***allocation*** technique in order to provide a QoS–enabled VPN. We apply dynamic resource ***allocation*** using traffic predictors. Our predictor assumes that the statistical behavior of ***aggregate*** traffic streams is statistically described through alpha – stable long–range dependent stochastic processes. This is a valid assumption, since some of the authors of this work proved in the past that such distributions more accurately describe ***aggregate*** traffic passing through modern networks as compared to earlier models. In our work, we investigate a scenario in which the service provider establishes service level agreements (SLA) with the customers, where the resources and QoS requirements are defined. When operating the network, the provider uses dynamic resource ***allocation*** algorithms to pace and forward traffic while optimizing the resource utilization. The conceptual architecture of this technology is provided along with a description of our Linux–based experimental testbed. We also discuss some important performance considerations obtained through extensive computer simulations. (12 refs).

Descriptors

bandwidth–allocation; Internet; multiprotocol–label–switching; operating–systems–computers; quality–of–service; ***resource–allocation;*** stochastic–processes; telecommunication–network–routing; telecommunication–traffic; virtual–private–networks.

Keywords

dynamic resource ***allocation;*** QoS enabled VPN; ***MPLS;*** virtual private networks; Linux implementation; quality of service; DiffServ; traffic predictors; statistical behavior; ***aggregate*** traffic streams; service level agreements; traffic forwarding; optimization; SLA; alpha stable stochastic processes; long range dependency; performance; Internet.

Classification codes

B6150M (Protocols).
B6150P (Communication network design, planning and routing).
B0240Z (Other topics in statistics).
B6210L (Computer communications).
C5640 (Protocols).
C1140Z (Other topics in statistics).
C5620W (Other computer networks).
C6150N (Distributed systems software).

Copyright statement

A distributed LSP mechanism to reduce spare *bandwidth* in *MPLS* networks.

Accession number & update

7387261, B2002-10-6150M-148, C2002-10-5640-104; 20020916.

Author(s)

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Author affiliation

Dept of EECS, KAIST, South Korea.

Source

Proceedings of IEEE International Conference on Communications, vol.2, New York, NY, USA, 28 April-2 May 2002.
In: p.1189-93 vol.2, 2002.

ISSN

ISBN: 0-7803-7400-2, CCCC: 0-7803-7400-2/02/ ($17.00).

Availability

Also available on CD-ROM in PDF format.

Publication year

2002.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

We propose a new label switched path (LSP) mechanism, called the distributed LSP (D-LSP) mechanism, for multiprotocol label switching ***(MPLS)*** networks. In the proposed D-LSP mechanism, traffic belonging to a forwarding equivalent class (FEC) is partitioned into several sub-classes and is distributed to the corresponding sub-LSPs, each of which is set up on a different node-disjoint route connecting the traffic source and destination node pair. To protect service, a D-LSP ***reserves*** the spare ***bandwidth*** of which the amount is equal to the amount of the working ***bandwidth*** of one sub-LSP and thus the total amount of spare ***bandwidth*** in a network can be reduced. The traffic partitioning of the D-LSP mechanism may decrease the statistical multiplexing gain obtained by ***aggregating*** IP packet flows into an LSP, as compared to that of the conventional ***MPLS*** networks. Sub-LSP and backup LSP assignment algorithms are proposed and the effect of D-LSP mechanism on the required amount of spare ***bandwidth*** is evaluated by numeric analysis and is compared with a conventional LSP mechanism. The results show that there is a trade-off between the reduction of spare ***bandwidth*** and the degradation of statistical multiplexing gain. (17 refs).

Descriptors

Internet; packet-switching; telecommunication-network-routing; telecommunication-traffic; transport-protocols.

Keywords

spare ***bandwidth*** reduction; distributed LSP mechanism; ***MPLS*** networks; label switched path; distributed LSP; forwarding equivalent class; Internet backbone networks; node disjoint route; traffic source node; traffic destination node; sub LSP; traffic partitioning; statistical multiplexing gain; IP packet flows; backup LSP assignment algorithm; sub LSP assignment algorithm; numerical analysis; multiprotocol label switching.

Classification codes

```
B6150M    (Protocols).
B6150P    (Communication network design, planning and routing).
B6210L    (Computer communications).
C5640     (Protocols).
C5620W    (Other computer networks).
```

Efficient resource *allocation* in self-healing multiprotocol label switching mesh networks.

Accession number & update

7306644, B2002-08-6150M-024, C2002-08-5640-016; 20020626.

Author(s)

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Dept of Comput & Inf Sci, Ohio State Univ, Columbus, OH, USA.

Source

GLOBECOM '01. IEEE Global Telecommunications Conference, vol.4, San Antonio, TX, USA, 25-29 Nov. 2001.
In: p.2671-5 vol.4, 2001.

ISSN

ISBN: 0-7803-7206-9, CCCC: 0-7803-7206-9/01/ ($17.00).

Availability

Also available on CD-ROM in PDF format.

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

This paper presents a restoration scheme to minimize spare ***bandwidth reservation*** of ***bandwidth*** guaranteed paths that can recover 100% from single failure in ***MPLS*** mesh networks. Our new algorithm establishes multiple backup LSP for each primary LSP while backup LSP are multiplexed efficiently to reduce the resource ***reserved*** for backup LSP. The new scheme has several advantages compared with current work: the overall resource requirements for backup paths are reduced by about 20% to 30%; it balances the network resource utilization during the backup path ***reservation*** stage, it also balances the network load at path switchover stage. The new algorithm can admit more ***bandwidth*** guaranteed flows and it can improve the survivability of the networks. It can recover from multiple link failures when it is used with admission control. We extend the RSVP protocol to support our path restoration scheme in ***MPLS*** networks. We present the procedures to setup the backup paths, perform label binding and ***reserve*** backup resources. Explicit notification is utilized to improve the response time of network failover. (7 refs).

Descriptors

bandwidth-allocation; computer-network-reliability; Internet; multiplexing; network-topology; protocols; quality-of-service; telecommunication-traffic.

Keywords

restoration scheme; minimization; spare ***bandwidth reservation;*** network load balancing; path switchover; ***bandwidth*** guaranteed flows; survivability; multiple link failures; RSVP protocol; label binding; explicit notification; resource ***allocation;*** self healing mesh networks; multiprotocol label switching; ***MPLS*** mesh networks; IP network; QoS; multiple backup LSP; multiplexing; label switched paths.

Classification codes

B6150M (Protocols).
B6210L (Computer communications).
B6150C (Communication switching).
C5640 (Protocols).
C5620W (Other computer networks).

Inter-domain LSP setup using *bandwidth management* points.

Accession number & update

7300103, B2002-07-6210L-134, C2002-07-5620W-069; 20020617.

Author(s)

Okumus-I-T; Junseok-Hwang; Mantar-H-A; Chaplin-S-J.

Author affiliation

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Source

GLOBECOM '01. IEEE Global Telecommunications Conference, vol.1, San Antonio, TX, USA, 25-29 Nov. 2001.

In: p.7-11 vol.1, 2001.

ISSN

ISBN: 0-7803-7206-9, CCCC: 0-7803-7206-9/01/ ($17.00).

Availability

Also available on CD-ROM in PDF format.

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

A Application; P Practical.

Abstract

Bandwidth management points (BMP) are a necessity to ***manage*** the intra and inter-domain resources in the Internet. We propose a way to setup inter-domain label switched path (LSP) with the help of a BMP in a multiprotocol label switching ***(MPLS)*** over the Diffserv network. We use extended simple inter-domain ***bandwidth*** broker signalling protocol (SIBBS) to distribute the labels inter-domain. We also use a BMP to interact with the ***MPLS*** to setup the intra-domain LSP and to provision the intra-domain traffic. With the help of a BMP, we show how end-to-end quality of service (QoS) can be achieved. (23 refs).

Descriptors

computer-network-management; Internet; protocols; quality-of-service; telecommunication-signalling; telecommunication-traffic.

Keywords

inter domain LSP setup; ***bandwidth management*** points; inter domain resource ***management;*** intra domain resource ***management;*** Internet; multiprotocol label switching; BMP; ***MPLS;*** Diffserv network; simple inter domain ***bandwidth*** broker signalling protocol; intra domain LSP; intra domain traffic; quality of service; QoS.

Classification codes

B6210L (Computer communications).
B6150M (Protocols).
C5620W (Other computer networks).
C5640 (Protocols).

Copyright statement

Path selection and *bandwidth allocation* in *MPLS* networks: a non-linear programming approach.

Accession number & update

7269573, B2002-06-6150M-084, C2002-06-5640-068; 20020520.

Author(s)

Burns-J-E; Ott-T-J; de-Kock-J-M; Krzesinski-A-E.

Author affiliation

Telcordia Technol Inc, Morristown, NJ, USA.

Internet Performance and Control of Network Systems II, Denver, CO, USA, 21-22 Aug. 2001.
Sponsors: SPIE.
In: Proceedings-of-the-SPIE-The-International-Society-for-Optical-Engineering (USA), vol.4523, p.15-26, 2001.

CODEN

PSISDG.

ISSN

ISSN: 0277-786X, CCCC: 0277-786X/01/ ($15.00).

Availability

SICI: 0277-786X(2001)4523L.15:PSBA; 1-0.

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper, J Journal Paper.

Treatment codes

T Theoretical or Mathematical; X Experimental.

Abstract

Multi-protocol label switching extends the IPv4 destination-based routing protocols to provide new and scalable routing capabilities in connectionless networks using relatively simple packet forwarding mechanisms. ***MPLS*** networks carry traffic on virtual connections called label switched paths. This paper considers path selection and ***bandwidth allocation*** in ***MPLS*** networks in order to optimize the network quality of service. The optimization is based upon the minimization of a nonlinear objective function which under light load simplifies to OSPF routing with link metrics equal to the link propagation delays. The behavior under heavy load depends on the choice of certain parameters: It can essentially be made to minimize maximal expected utilization, or to maximize minimal expected weighted slacks (both over all links). Under certain circumstances it can be made to minimize the probability that a link has an instantaneous offered load larger than its transmission capacity. We present a model of an ***MPLS*** network and an algorithm to find and capacitate optimal LSP. The algorithm is an improvement of the well-known flow deviation nonlinear programming method. The algorithm is applied to compute optimal LSP for several test networks carrying a single traffic class. (10 refs).

Descriptors

bandwidth-allocation; Internet; minimisation; nonlinear-programming; packet-switching; probability; quality-of-service; telecommunication-network-routing; telecommunication-traffic; transport-protocols.

Keywords

path selection; ***bandwidth allocation; MPLS*** networks; nonlinear programming; multi protocol label switching; IPv4; destination based routing protocols; scalable routing; connectionless networks; packet forwarding; virtual connections; label switched paths; quality of service; minimization; nonlinear objective function; OSPF routing; link propagation delays; traffic load; maximal expected utilization; minimal expected weighted slacks; probability; transmission capacity; LSP; Internet protocol.

Classification codes

B6150M (Protocols).
B6150P (Communication network design, planning and routing).
B0260 (Optimisation techniques).
B6210L (Computer communications).
B0240Z (Other topics in statistics).
C5640 (Protocols).
C1180 (Optimisation techniques).
C5620W (Other computer networks).
C1140Z (Other topics in statistics).

Copyright statement

Effective *bandwidth* guaranteed routing schemes for *MPLS* traffic engineering.

Accession number & update
7214104, B2002-04-6210L-210, C2002-04-5620W-113; 20020325.

Author(s)
Bin-Wang; Jain-N.

Author affiliation
Dept of Comput Sci & Eng, Wright State Univ, Dayton, OH, USA.

Source
Quality of Service over Next-Generation Data Networks, Denver, CO, USA, 21-22 Aug. 2001.
Sponsors: SPIE.
In: Proceedings-of-the-SPIE-The-International-Society-for-Optical-Engineering (USA), vol.4524, p.81-90, 2001.

CODEN
PSISDG.

ISSN
ISSN: 0277-786X, CCCC: 0277-786X/01/ ($15.00).

Availability
SICI: 0277-786X(2001)4524L.81:EBGR; 1-K.

Publication year
2001.

Language
EN.

Publication type
CPP Conference Paper, J Journal Paper.

Treatment codes
T Theoretical or Mathematical.

Abstract
We present online algorithms for dynamic routing ***bandwidth-guaranteed*** label switched paths (LSP) where LSP set-up requests (in terms of a pair of ingress and egress routers as well as its ***bandwidth*** requirement) arrive one by one and there is no a priori knowledge regarding future LSP set-up requests. In addition, we consider rerouting of LSP. Rerouting of LSP has not been well studied in previous work on LSP routing. The need for LSP rerouting arises in a number of ways: occurrence of faults (link and/or node failures), re-optimization of existing LSP routes to accommodate traffic fluctuation, requests with higher priorities, and so on. We formulate the ***bandwidth-guaranteed*** LSP routing with rerouting capability as a multi-commodity flow problem. The solution to this problem is used as the benchmark for comparing other computationally less costly algorithms. Furthermore, to more efficiently utilize the network resources, we propose online routing algorithms which route ***bandwidth*** demands over multiple paths at the ingress router to satisfy the customer requests while providing better service survivability. Traffic splitting and distribution over the multiple paths are carefully handled using table-based hashing schemes while the order of packets within a flow is preserved. Preliminary simulations are conducted to show the performance of different design choices and the effectiveness of the rerouting and multi-path routing algorithms in terms of LSP set-up request rejection probability and ***bandwidth*** blocking probability. (19 refs).

Descriptors
bandwidth-allocation; Internet; packet-switching; performance- evaluation; probability; quality-of-service; telecommunication-congestion-control; telecommunication-network-reliability; telecommunication-network-routing; telecommunication-traffic.

Keywords
bandwidth guaranteed routing; ***MPLS;*** traffic engineering; online algorithms; routers; rerouting; faults; re optimization; traffic fluctuation; priorities; multi commodity flow problem; network resources; multiple paths; service survivability; traffic splitting; table based hashing schemes; packet flow; performance; multi path routing algorithms; set up request rejection probability; ***bandwidth*** blocking probability; quality of service; constraint based routing; Internet; dynamic routing; label switched paths; LSP.

Classification codes
B6210L (Computer communications).

B6150C (Communication switching).
C5620W (Other computer networks).
C5670 (Network performance).

Copyright statement

Path computation for traffic engineering in *MPLS* networks.

Accession number & update

7175390, B2002-03-6150P-033, C2002-03-5620W-065; 20020211.

Author(s)

Banerjee-G; Sidhu-D; Ed. by Lorenz-P.

Author affiliation

Maryland Center for Telecommun Res, Maryland Univ, Baltimore, MD, USA.

Source

Networking ICN 2001 - First International Conference on Networking. Proceedings. Part II, Colmar, France, 9-13 July 2001.
In: p.302-8, 2001.

ISSN

ISBN: 3-540-42303-6.

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

We consider the problem of computing traffic engineered paths for ***bandwidth*** requests, when these requests arrive in the network independent of one another. ***Reservation*** of ***bandwidth*** along pre-selected paths has become important in networks providing service differentiation and ***bandwidth*** guarantees to applications. Service providers are looking at traffic engineering to automate path selection procedures and to maintain network loading at an optimal level. Sophisticated path selection algorithms are being developed which deviate from the "shortest path" philosophy in traditional IP networks. While these algorithms perform well under moderate network loads, their behavior under high load conditions often leads to risks of network instability. In addition, these sophisticated algorithms are often computationally intensive. In this paper we provide an O (nlogn) algorithm that improves network utilization under moderate load and also maintains stability under high load conditions. We show that the algorithm reduces the complexity of a competitive algorithm and achieves better performance. (7 refs).

Descriptors

competitive-algorithms; computational-complexity; Internet; quality-of-service; telecommunication-congestion-control; telecommunication-traffic.

Keywords

traffic engineering; path computation; ***MPLS*** networks; ***bandwidth*** requests; ***bandwidth reservation;*** service differentiation; ***bandwidth*** guarantees; optimal network loading; path selection algorithms; stability; complexity.

Classification codes

B6150P (Communication network design, planning and routing).
B6210L (Computer communications).
C5620W (Other computer networks).
C4240C (Computational complexity).

Copyright statement

The design of optimal multi-service *MPLS* networks.

Accession number & update

7173612, B2002-03-6150P-015, C2002-03-5670-007; 20020211.

Author(s)

Arvidsson-A; Krzesinski-A.

Source

Telektronikk (Norway), vol.97, no.2-3, p.116-29, 2001. , Published: Telenor Communications AS.

CODEN

TKTKAW.

ISSN

ISSN: 0085-7130.

Availability

SICI: 0085-7130(2001)97:2/3L.116:DOMS; 1-B.

Publication year

2001.

Language

EN.

Publication type

J Journal Paper.

Treatment codes

P Practical; T Theoretical or Mathematical.

Abstract

Multiprotocol label switching ***(MPLS)*** extends the IP destination-based routing protocols to provide new and scalable routing capabilities in connectionless networks using relatively simple packet forwarding mechanisms. ***MPLS*** networks carry traffic ***aggregates*** on virtual connections called label switched paths (LSP). The first part of this paper examines under what circumstances it is advantageous to design dedicated LSP for individual origin-destination pairs and service classes. We show that separate LSP in most realistic cases are likely to be the preferred mode of operation. We next consider path selection and ***bandwidth allocation*** in multi-service ***MPLS*** networks in order to optimise the overall network quality of service. The optimisation is based upon the constrained optimisation of a nonlinear objective function. We present a model of an ***MPLS*** network and a computationally efficient algorithm called XFG to find and capacitate optimal LSP. The algorithm is based on a ***bandwidth*** market where ***bandwidth*** prices determine the ***allocation*** of ***bandwidth*** to LSP. The XFG algorithm is applied to compute optimal LSP for a 55 node network model carrying 6 service classes. The results above are limited to service classes typically supported by UDP, eg, conversational voice and streaming video, where the notation of equivalent ***bandwidth*** can be applied. This is, however, not the case for service classes typically supported by TCP, eg, interactive or background data, because of the responsiveness of the protocol. We therefore extend our work to incorporate these types of traffic and apply the XFG algorithm to compute optimal LSP for a network of 8 nodes and 2 service classes. Finally we use core networks of third-generation cellular mobile systems as an example to show how the method can be generalised to any multi-service network and we also discuss how to include virtual private networks. (24 refs) .

Descriptors

bandwidth-allocation; cellular-radio; Internet; nonlinear-functions; optimisation; packet-switching; protocols; quality-of-service; telecommunication-network-routing; telecommunication-traffic.

Keywords

multiprotocol label switching; ***MPLS;*** IP routing protocols; scalable routing; connectionless networks; packet forwarding; traffic ***aggregates;*** virtual connections; label switched paths; service classes; origin destination pairs; path selection; ***bandwidth allocation;*** quality of service; constrained optimisation; nonlinear objective function; XFG algorithm; ***bandwidth*** prices; UDP; conversational voice; streaming video; equivalent ***bandwidth;*** TCP; interactive data; background data; third generation cellular systems; mobile systems; virtual private networks

Classification codes

B6150P (Communication network design, planning and routing).
B6150M (Protocols).
B6210L (Computer communications).
B6150C (Communication switching).
B6250F (Mobile radio systems).
C5670 (Network performance).
C5640 (Protocols).
C5620W (Other computer networks).

A review of quality of service mechanisms in IP-based networks- integrated and differentiated services, multi-layer switching, *MPLS* and traffic engineering.

Accession number & update

7149718, B2002-02-6210L-116, C2002-02-5620W-065; 20020122.

Author(s)

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Dept of Comput Sci, Canterbury Univ, Christchurch, New Zealand.

Source

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ISSN

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Availability

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Publication year

2002.

Language

EN.

Publication type

J Journal Paper.

Treatment codes

P Practical.

Abstract

ISPs are facing the challenge of offering improved quality of service (QoS) to their customers. No longer is best effort delivery with no service guarantee acceptable for many applications. Although ATM has provided a limited solution by way of service classes, such a solution pre-supposed an underlying ATM network which-in the case of pure IP traffic-may not be the case. Rather IP traffic requires a degree of engineering into service classes (differentiated services, DiffServ) as well as a break from traditional layer three-based routing. Although access to virtually unlimited ***bandwidth*** via WDM and Photonic Networks may potentially offer a solution to the QoS issue, access to such services on a universal basis is not a services class paradigm and using a label switching technique is seen as an appropriate medium term solution. Further, label switching offers a simple and efficient mechanism for IP traffic engineering, multi-service functionality and scalability. This paper examines a number of service classifications and solutions, which aim to provide a realistic QoS solution. In particular it addresses Integrated and DiffServ, multi-layer switching and ***MPLS,*** which forms the basis of DiffServ as it allows ISPs to deliver new services not easily supportable by conventional IP routing infrastructure. Finally the paper makes some important observations about traffic engineering. (32 refs).

Descriptors

Internet; quality-of-service; telecommunication-traffic.

Keywords

ISPs; QoS; ATM; IP traffic; differentiated services; DiffServ; integrated services; IntServ; ***bandwidth manager;*** multi layer switching; ***MPLS;*** multi protocol label switching; traffic engineering.

Classification codes

B6210L (Computer communications).
C5620W (Other computer networks).
C6150N (Distributed systems software).

Dynamic partitioning of link *bandwidth* in *IP/MPLS* networks.

Accession number & update

7113510, B2002-01-6210L-162, C2002-01-5620W-096; 20011203.

Author(s)

Rakocevic-V; Griffiths-J-M; Cope-G.

Author affiliation

Dept of Electron Eng, London Univ, UK.

Source

Proceedings of International Conference on Communications, vol.9, Helsinki, Finland, 11-14 June 2001. In: p.2918-22 vol.9, 2001.

ISSN

ISBN: 0-7803-7097-1, CCCC: 0 7803 7097 1/2001/ ($10.00).

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

P Practical; T Theoretical or Mathematical.

Abstract

Bandwidth allocation in the future multiservice global communication IP network presents a very interesting research issue. This paper presents the strategy of dynamic partitioning of link ***bandwidth*** in IP networks. In the dynamic partitioning scheme the ***bandwidth*** of each link in the network is partitioned into two fractions, one for the low-priority data traffic, and one for the high-priority stream (real-time) traffic. The partitioning is defined by the partitioning parameter, which changes according to the traffic profile and intensity. An algorithm for the change of partitioning parameter is presented. The evaluation of the scheme is done based on a new metric, the connection utility, which is the measurement of the average end-user utility. Based on this measurement, the dynamic partitioning scheme is compared to several other ***bandwidth allocation*** schemes. Simulation results on a single link network model show the advantage of the dynamic link partitioning. Furthermore, the paper discusses the use of multiprotocol label switching ***(MPLS)*** architecture for the implementation of the dynamic partitioning scheme. (8 refs).

Descriptors

bandwidth-allocation; Internet; protocols; telecommunication-traffic.

Keywords

dynamic partitioning; link ***bandwidth;*** IP ***MPLS*** networks; ***bandwidth allocation;*** future multiservice global communication IP network; low priority data traffic; high priority stream traffic; real time traffic; partitioning parameter; connection utility; average end user utility; simulation results; single link network model; multiprotocol label switching; ***MPLS*** architecture; Internet.

Classification codes

B6210L (Computer communications).
B6150M (Protocols).
C5620W (Other computer networks).
C5640 (Protocols).

Performance analysis of IP datagram transmission delay in *MPLS:* impact of both the number and the *bandwidth* of LSPs of layer 2.

Accession number & update

7106198, B2002-01-6150M-038, C2002-01-5640-029; 20011127.

Author(s)

Nakazawa-S; Tamura-H; Kawahara-K; Oie-Y.

Author affiliation

Dept of Comput Sci & Electron, Kyushu Inst of Technol, Iizuka, Japan.

Source

Proceedings of International Conference on Communications, vol.4, Helsinki, Finland, 11-14 June 2001. In: p.1006-10 vol.4, 2001.

ISSN

ISBN: 0-7803-7097-1, CCCC: 0 7803 7097 1/2001/ ($10.00).

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

LSR (label switching router)s in ***MPLS*** (multiprotocol label switching) networks map arriving IP flows into some labels on the layer 2 switching fabric and establish LSP (label switching path)s. By using LSPs, LSRs not only transmit IP datagrams fast with a cut-through mechanism, but also solve the traffic engineering issue to optimize the delay of some IP datagram flows. So far, we have analyzed the performance of LSR focusing only on the maximum number of LSPs which can be set on layer 2. We also consider the ***bandwidth allocated*** to each LSP and analyze the IP datagram transmission delay and the cut-through rate of LSR. We suppose the label mapping method as the data-driven scheme in the analytical model, so that the physical ***bandwidth*** of LSR is shared by both the default LSP for hop-by-hop transmission and the cut-through LSPs. Thus, we investigate the impact of the ***bandwidth allocation*** among these LSPs on the performance. (10 refs).

Descriptors

bandwidth-allocation; data-communication; delays; packet-switching; switching-networks; telecommunication-network-routing; telecommunication-traffic; transport-protocols.

Keywords

performance analysis; IP datagram transmission delay; ***MPLS*** networks; layer 2 LSP; label switching router; multiprotocol label switching; layer 2 switching fabric; label switching path; cut through mechanism; traffic engineering; delay optimization; ***bandwidth allocation;*** cut through rate; label mapping method; data driven scheme; analytical model; hop by hop transmission; steady state probability; ATM switch; Internet.

Classification codes

B6150M (Protocols).
B6150P (Communication network design, planning and routing).
C5640 (Protocols).

Copyright statement

An oriented diffusion algorithm for routing paths in *MPLS* network.

Accession number & update

7092293, B2001-12-6150P-055; 20011112.

Author(s)

Abouaissa-A; Amanton-L; Lorenz-P.

Author affiliation

IUT/GTR, Haute-Alsace Univ, Colmar, France.

Source

EUROCON'2001. International Conference on Trends in Communications. Technical Program, Proceedings, vol.1, Bratislava, Slovakia, 4-7 July 2001.
Sponsors: IEEE.
In: p.54-7 vol.1, 2001.

ISSN

ISBN: 0-7803-6490-2, CCCC: 0 7803 6490 2/2001/ ($10.00).

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

P Practical.

Abstract

We propose a new algorithm for guaranteed ***bandwidth*** routing. The problem is motivated by the needs of service providers to set-up ***bandwidth*** guaranteed paths quickly in their backbone or transport networks. For that, one way to provide a routing ***bandwidth*** is to use ***MPLS*** (multiprotocol label switching). An important context in which these problems arise is that of a dynamic label switched path (LSP) set up in ***MPLS*** between ingress and egress nodes. The routes of the LSPs can be specified explicitly. In addition, with the establishment of backup LSPs, a network will be able to cope with failure in nodes and links. (13 refs).

Descriptors

bandwidth-allocation; packet-switching; telecommunication-network- routing.

Keywords

oriented diffusion algorithm; routing paths; ***MPLS*** network; guaranteed ***bandwidth*** routing; service providers; ***bandwidth*** guaranteed paths; backbone network; transport network; multiprotocol label switching; dynamic label switched path; ingress node; egress node; node failure; link failure; packet forwarding.

Classification codes

B6150P (Communication network design, planning and routing).
B6150C (Communication switching).

Copyright statement

Dynamic routing of locally restorable *bandwidth* guaranteed tunnels using *aggregated* link usage information.

Accession number & update

7061998, B2001-11-6150P-037; 20011015.

Author(s)

Kodialam-M; Lakshman-T-V.

Author affiliation

Lucent Technol, Bell Labs, Holmdel, NJ, USA.

Source

Proceedings IEEE INFOCOM 2001. Conference on Computer Communications. Twentieth Annual Joint Conference of the IEEE Computer and Communications Society, vol.1, Anchorage, AK, USA, 22-26 April

2001.
Sponsors: IEEE Comput. Soc. IEEE Commun. Soc.
In: p.376-85 vol.1, 2001.

ISSN

ISBN: 0-7803-7016-3, CCCC: 0 7803 7016 3/2001/ ($10.00).

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

We consider a new QoS routing problem which requires the on-line routing of a ***bandwidth*** guaranteed path along with the setting up of bypass paths for every link or node traversed by the primary active path. The bypass paths are used for fast local restoration where upon a link or node failure, the first upstream node re-establishes path continuity (with ***bandwidth*** guarantees) by switching to the bypass path for the failed node or link, The routing objective is to minimize the ***bandwidth*** usage for each connection so as optimize use of network resources while protecting against single node or link failure. ***Bandwidth*** efficiency is achieved by exploiting the potential for inter-demand and intra-demand backup ***bandwidth*** sharing. We develop a new algorithm for this routing problem which only uses ***aggregated*** link usage information (total ***bandwidth*** consumed on each link by active paths, total ***bandwidth*** consumed on each link by backup paths, and the residual bandwidths) that is easily obtainable by proposed routing protocol extensions. We show that the algorithm performs well in terms of the number of rejected requests and the total ***bandwidth*** used, The main use of this algorithm is for ***MPLS*** network routing and for wavelength routing in optical networks with wavelength conversion. (12 refs).

Descriptors

optical-fibre-networks; protocols; quality-of-service; telecommunication-network-reliability; telecommunication-network-routing.

Keywords

dynamic routing; locally restorable ***bandwidth*** guaranteed tunnels; ***aggregated*** link usage information; ***MPLS;*** multi protocol label switching; dynamic provisioning; ***bandwidth*** guaranteed paths; wavelength paths; backup paths; service provider requirement; resource utilization; sharing performance; traffic engineering extensions; routing protocols; shortest path computations.

Classification codes

B6150P (Communication network design, planning and routing).
B6150M (Protocols).
B6260F (Optical fibre networks).

Resource *allocation* and admission control styles in QoS DiffServ networks.

Accession number & update

7028385, B2001-10-6150M-111, C2001-10-5640-076; 20010903.

Author(s)

Gerla-M; Casetti-C; Lee-S-S; Reali-G; Ed. by Marsan-M-A; Bianco-A.

Author affiliation

Dept of Comput Sci, California Univ, Los Angeles, CA, USA.

Source

Quality of Service in Multiservice IP Networks. International Workshop, Q0S-IP 2001. Proceedings, Rome, Italy, 24-26 Jan. 2001.

Commun. Networks.
In: p.113-28, 2001.

ISSN

ISBN: 3-540-41512-2.

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

We propose a DiffServ architecture for the support of real-time traffic (e.g., video) with QoS constraints (e.g., ***bandwidth*** and delay) over an IP domain. The main goal of the paper is to identify solutions which provide QoS guarantees without requiring per flow processing in the core routers (as is commonly done in IntServ solutions) and which are thus scalable. We propose, and evaluate through simulation, different approaches for call admission control (CAC) and resource ***allocation.*** These approaches are all consistent with the DiffServ model, but place different processing and signaling loads on edge and core routers. Paths are computed by means of a QoS routing algorithm, Q-OSPF, and ***MPLS*** is used to handle explicit routing and class separation. (20 refs).

Descriptors

bandwidth-allocation; Internet; protocols; quality-of-service; telecommunication-congestion-control; telecommunication-network-routing; telecommunication-traffic.

Keywords

resource ***allocation;*** DiffServ; real time traffic; IP networks; QoS guarantees; scalable architecture; call admission control; CAC; signaling loads; edge routers; core routers; routing algorithm; Q OSPF; ***MPLS;*** explicit routing; class separation.

Classification codes

```
B6150M    (Protocols).
B6210L    (Computer communications).
B6150P    (Communication network design, planning and routing).
C5640     (Protocols).
C5620W    (Other computer networks).
C5670     (Network performance).
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Copyright statement

A *management* and control architecture for providing IP differentiated services in *MPLS-based* networks.

Accession number & update

6935041, B2001-07-6210C-013, C2001-07-5620W-008; 20010528.

Author(s)

Trimintzios-P; Andrikopoulos-I; Pavlou-G; Flegkas-P; Griffin-D; Georgatsos-P; Goderis-D; T-Joens-Y; Georgiadis-L; Jacquenet-C; Egan-R.

Author affiliation

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Source

IEEE-Communications-Magazine (USA), vol.39, no.5, p.80-8, May 2001. Published: IEEE

CODEN
ICOMD9.
ISSN
ISSN: 0163-6804, CCCC: 0163-6804/2001/ ($10.00).
Availability
SICI: 0163-6804(200105)39:5L.80:MCAP; 1-U.
Publication year
2001.
Language
EN.
Publication type
J Journal Paper.
Treatment codes
A Application; P Practical.
Abstract
As the Internet evolves toward the global multiservice network of the future, a key consideration is support for services with guaranteed quality of service. The proposed differentiated services framework is seen as the key technology to achieve this. DiffServ currently concentrates on control/data plane mechanisms to support QoS, but also recognizes the need for ***management*** plane aspects through the ***bandwidth*** broker. In this article we propose a model and architectural framework for supporting DiffServ-based end-to-end QoS in the Internet, assuming underlying ***MPLS-based*** explicit routed paths. The proposed integrated ***management*** and control architecture will allow providers to offer both quantitative and qualitative services while optimizing the use of underlying network resources. (10 refs).
Descriptors
computer-network-management; Internet; quality-of-service; telecommunication-control; telecommunication-network-routing; transport-protocols.
Keywords
IP differentiated services; ***MPLS*** based networks; Internet; global multiservice network; guaranteed quality of service; differentiated services; QoS; ***bandwidth*** broker; DiffServ based end to end QoS; ***MPLS*** based explicit routed paths; integrated ***management*** control architecture; quantitative services; qualitative services; network resources; multiprotocol label switching.
Classification codes
B6210C (Network ***management***).
B6150M (Protocols).
B6210L (Computer communications).
B6150P (Communication network design, planning and routing).
C5620W (Other computer networks).
C5640 (Protocols).

Research on adaptive IP QoS *management* framework based on DiffServ.

Accession number & update
6934746, B2001-07-6210C-012, C2001-07-7410F-013; 20010528.
Author(s)
Tang-Yong; Yang-Xue-Liang; Ou-Hai-Xiang; Li-Xian-Ji; Peng-Chong-Jia.
Author affiliation
Dept of Comput Sci, Univ of Sci & Technol of China, Beijing, China.
Source
Journal-of-System-Simulation (China), vol.13, no.3, p.394-9, May 2001. , Published: Editorial Committee of J. Systems Simulation.
ISSN
ISSN: 1004-731X

Availability

SICI: 1004–731X(200105)13:3L.394:RAMF; 1–I.

Publication year

2001.

Language

CH.

Publication type

J Journal Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

IP QoS (quality of services) is one of the core technologies of IP network. There are many kinds of mechanism to achieve IP QoS, such as Sub ***Bandwidth Management*** (SBM), Multiple Protocols Label Switching ***(MPLS),*** Integrated services (IntServ), Differentiated Service (Diff Serv) and so on, but some of the above should be integrated for implementing complete IP QoS. At present, one of the most popular ideas is to adopt IntServ on the edge of network and DiffServ on the backbone. We propose an IP QoS ***management*** framework for complete end–to–end adaptive QoS by integrating DiffServ with IntServ, and put forward an adaptive control algorithm of IP QoS on DiffServ Interior Router nodes. An experiment result based on NS2, a network simulator software system, is discussed. (14 refs).

Descriptors

adaptive–control; quality–of–service; telecommunication–control; ***telecommunication–network–management.***

Keywords

IP QoS; DiffServ; IP network; IntServ; IP QoS ***management*** framework; adaptive control; DiffServ Interior Router.

Classification codes

B6210C (Network ***management***).
C7410F (Communications computing).
C1340E (Self-adjusting control systems).
C3370 (Control applications in telecommunications).

Search strategy

No.	Database	Search term	Info added since	Results
2	INZZ	bandwidth	unrestricted	88447
3	INZZ	allocat$4 OR reserv$6 OR manag$6 OR aggreg$6	unrestricted	469533
6	INZZ	multiprotocol OR multi ADJ protocol	unrestricted	1626
8	INZZ	2 NEAR 3	unrestricted	5383
11	INZZ	6 AND 8	unrestricted	112

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DataStar Web

Documents

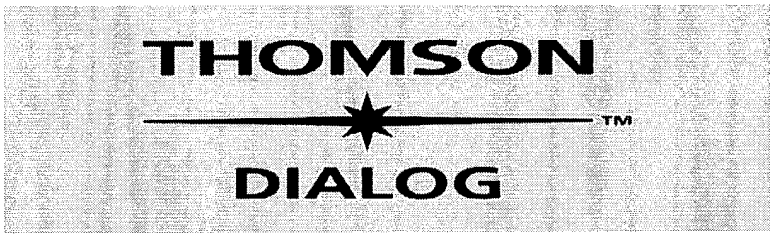

Table of Contents

Dynamic routing of restorable *bandwidth-guaranteed* tunnels using *aggregated* network resource usage information.

Accession number & update
7684381, B2003-08-6150P-036; 20030714.

Author(s)
Kodialam-M; Lakshman-T-V.
Author affiliation
Lucent Technol Bell Labs, Holmdel, NJ, USA.

Source
IEEE-ACM-Transactions-on-Networking (USA), vol.11, no.3, p.399-410, June 2003. , Published: IEEE; ACM.
CODEN
IEANEP.
ISSN
ISSN: 1063-6692, CCCC: 1063-6692/03/ ($17.00).
Availability
SICI: 1063-6692(200306)11:3L.399:DRRB; 1-E.
Publication year
2003.
Language
EN.
Publication type
J Journal Paper.
Treatment codes
P Practical; T Theoretical or Mathematical.

Abstract
The paper presents new algorithms for dynamic routing of restorable ***bandwidth-guaranteed*** paths. We assume that connections are requested one-by-one and there is no prior knowledge of future arrivals. In order to guarantee restorability an alternate link (node) disjoint backup (restoration) path has to be determined, as well as an active path, when the connection is initiated. This joint on-line routing problem is particularly important in optical networks and in MPLS networks for dynamic provisioning of ***bandwidth-guaranteed*** or wavelength paths. A simple solution is to find two disjoint paths, but this results in excessive resource usage. Backup path ***bandwidth*** usage can be reduced by judicious sharing of backup paths amongst certain active paths while still maintaining restorability. The best sharing performance is achieved if the routing of every path in progress in the network is known to the routing algorithm at the time of a new path setup. We give a new integer programming formulation for this problem. Complete path routing knowledge is a reasonable assumption for a centralized routing algorithm, but is not often desirable, particularly when distributed routing is preferred. We show that a suitably developed algorithm which uses only ***aggregated*** information, and not per-path information, is able to perform almost as well as one using complete information. Disseminating this ***aggregate*** information is feasible using proposed traffic engineering extensions to routing protocols. We formulate the dynamic restorable ***bandwidth*** routing problem in this ***aggregate*** information scenario and develop efficient routing algorithms. The performance of our algorithm is close to the complete information bound. (29 refs).

Descriptors
linear-programming; ***multiprotocol-label-switching***; optical-fibre-networks; quality-of-service;

routing-protocols; telecommunication-traffic.

Keywords

dynamic routing; restorable ***bandwidth*** guaranteed tunnels; ***aggregated*** network resource usage information; restorable ***bandwidth*** guaranteed paths; optical networks; MPLS networks; ***bandwidth*** usage; integer programming formulation; distributed routing; traffic engineering; routing protocols.

Classification codes

B6150P (Communication network design, planning and routing).
B6150M (Protocols).
B0260 (Optimisation techniques).
B6260F (Optical fibre networks).

Digital object identifier

http://dx.doi.org/10.1109/TNET.2003.813044.

Routing *bandwidth* guaranteed paths with local restoration in label switched networks.

Accession number & update

7664442, B2003-07-6150M-141; 20030622.

Author(s)

Li-Li; Buddhikot-M-M; Chekuri-C; Guo-K.

Source

Proceedings 10th IEEE International Conference on Network Protocols, Paris, France, 12-15 Nov. 2002.
Sponsors: IEEE Comput. Soc. Tech. Committee on Distributed Process.
In: p.110-20, 2002.

ISSN

ISBN: 0-7695-1856-7, CCCC: 1092-1628/02/ ($17.00).

Publication year

2002.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

P Practical; T Theoretical or Mathematical.

Abstract

The emerging ***multi-protocol*** label switching (MPLS) networks enable network service providers to route ***bandwidth*** guaranteed paths between customer sites (see Davie, B. and Rekhter, Y., 2000; Awduche, D. et. al., 1999; Sharma, V. et al., 2002; Jamoussi et al., 2002). This basic label switched path (LSP) routing is often enhanced using restoration routing which sets up alternate LSPs to guarantee uninterrupted connectivity in case network links or nodes along the primary path fail. We address the problem of distributed routing of restoration paths, defined as follows: given a request for a ***bandwidth*** guaranteed LSP between two nodes, find a primary LSP and a set of backup LSPs that protect the links along the primary LSP. A routing algorithm that computes these paths must optimize the restoration latency and the amount of ***bandwidth*** used. We introduce the concept of "backtracking" to bound the restoration latency. We consider three different cases characterized by a parameter called backtracking distance, D: (1) no backtracking (D=0); (2) limited backtracking (D=k); (3) unlimited backtracking (D= infinity). We use a link cost model that captures ***bandwidth*** sharing among links using various types of ***aggregate*** link state information. We first show that joint optimization of primary and backup paths is NP-hard in all cases. We then consider algorithms that compute primary and backup paths in two separate steps. Using link cost metrics that capture ***bandwidth*** sharing, we devise heuristics for each case. Our simulation study shows that these algorithms offer a way to tradeoff ***bandwidth*** to meet a range of restoration latency requirements. (18 refs).

Descriptors

backtracking; computational-complexity; ***multiprotocol-label-switching;*** optimisation; quality-of-service; routing-protocols.

Keywords

bandwidth guaranteed paths; local restoration paths; label switched networks; ***multi protocol*** label switching; MPLS; label switched path routing; distributed routing; restoration latency; backtracking distance; ***bandwidth*** sharing; link state information; quality of service; QoS.

Classification codes

B6150M (Protocols).
B6150P (Communication network design, planning and routing).
B0260 (Optimisation techniques).

New methods for more effective use of *bandwidth* in MPLS networks with fast rerouting.

Accession number & update

7576143, B2003-05-6150P-007; 20030414.

Author(s)

Matsuoka-Y; Kurimoto-T; Nishikido-J; Urushidani-S.

Source

APOC 2002: Asia-Pacific Optical and Wireless Communications. Optical Networking II, Shanghai, China, 16-18 Oct. 2002.
Sponsors: SPIE, Nortel Networks, Santec Corp., Walden Int., JDS Uniphase Corp., et al.
In: Proceedings-of-the-SPIE-The-International-Society-for-Optical-Engineering (USA), vol.4910, p.257-65, 2002.

CODEN

PSISDG.

ISSN

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Availability

SICI: 0277-786X(2002)4910L.257:MMEB; 1-0.

Publication year

2002.

Language

EN.

Publication type

CPP Conference Paper, J Journal Paper.

Treatment codes

N New Development; P Practical.

Abstract

Multi-protocol label switching (MPLS) technology is useful for IP virtual private networks (IP-VPNs), guaranteeing ***bandwidth*** in IP networks, and carrying out traffic engineering with explicit routing. The advantage of MPLS is its high capability to achieve reliable networks when used with fast rerouting. However, fast rerouting requires a high usage of network resources, but this usage may be reduced by sharing ***bandwidth*** among secondary LSPs (label switched paths). We propose a new routing algorithm which shares ***bandwidth*** among secondary LSPs for multiple primary LSPs, producing efficient network-level LSP designs. We apply three approaches to the dynamic changing of open shortest path first (OSPF) link-cost metrics to improve the efficiency in sharing of LSPs: (1) a broader distribution of primary LSPs to reduce the need for detours in cases of single failures; (2) the concentration of secondary LSPs on links to increase the possibility of ***bandwidth*** sharing; (3) the distribution of secondary LSPs that cater to a certain failure. The scheme provides some improvement over the results of the conventional Dijkstra-algorithm calculation used in conventional OSPF. The proposed algorithms are applied with various network models that have been proposed in IETF drafts; the results are evaluated on the basis of parameters that indicate the consumption of

result for the conventional form of ***bandwidth*** sharing, i.e., for sharing among the secondary LSPs of a single primary LSP. (2 refs).

Descriptors

bandwidth-allocation; multiprotocol-label-switching; telecommunication-network-reliability; telecommunication-network-routing; telecommunication-traffic.

Keywords

MPLS networks; fast rerouting; ***multi protocol*** label switching; IP virtual private networks; IP VPN; reliable networks; ***bandwidth*** sharing; LSP; label switched paths; open shortest path first; Dijkstra algorithm; IETF drafts.

Classification codes

B6150P (Communication network design, planning and routing).
B6150M (Protocols).
B0170N (Reliability).

Towards QoS in IP-based core networks. A survey on performance *management,* MPLS case.

Accession number & update

7547677, B2003-04-6210L-105, C2003-04-5620W-048; 20030310.

Author(s)

Marzo-J-L; Maryni-P; Vila-P; Ed. by Obaidat-M-S; Davoli-F.

Author affiliation

Institut d'Informatica i Aplicacions, Univ de Girona, Spain.

Source

Proceedings of 2001 International Symposium on Performance Evaluation of Computer and Telecommunication Systems, Orlando, FL, USA, 15-19 July 2001.
Sponsors: Soc. Modeling & Simulation Int.
In: p.269-75, 2001.

ISSN

ISBN: 1-56555-240-7.

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

P Practical.

Abstract

After presenting a vision on how the future QoS will be affected by new Internet protocols and schemes, a study on the problem of dynamic ***bandwidth re-allocation*** is described. The study focuses on the core network, which is still seen as being far from offering the quality levels of the current telephone infrastructure in terms of such factors as availability, reliability, predictability, controllability and robustness. To date, one of the main objectives in optimizing network resource utilization is to balance the network load by using re-routing techniques and ***bandwidth*** reallocation on a medium term scale. A possible scenario combining different technologies such as MPLS and DiffServ and an example of ***bandwidth*** reallocation are provided. (27 refs).

Descriptors

bandwidth-allocation; Internet; ***multiprotocol-label-switching;*** performance-evaluation; quality-of-service; ***resource-allocation;*** routing-protocols; telecommunication-traffic.

Keywords

Internet protocols; quality of service; ***bandwidth allocation; multiprotocol*** label switching networks;

Classification codes

B6210L (Computer communications).
B6150M (Protocols).
B6150P (Communication network design, planning and routing).
B6150C (Communication switching).
C5620W (Other computer networks).
C5640 (Protocols).
C5670 (Network performance).

Multi-constrained path computation for traffic engineering in MPLS networks.

Accession number & update

7547674, B2003-04-6150P-014, C2003-04-5640-034; 20030310.

Author(s)

Banerjee-G; Sidhu-D; Ed. by Obaidat-M-S; Davoli-F.

Author affiliation

Dept of Comput Sci & Electron Eng, Maryland Univ, Baltimore, MD, USA.

Source

Proceedings of 2001 International Symposium on Performance Evaluation of Computer and Telecommunication Systems, Orlando, FL, USA, 15-19 July 2001.
Sponsors: Soc. Modeling & Simulation Int.
In: p.241-8, 2001.

ISSN

ISBN: 1-56555-240-7.

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

There is a need to develop sophisticated path selection algorithms which deviate from the shortest-path routing philosophy in traditional IP networks. To address this need, a traffic engineering (TE) path selection algorithm that selects paths based on ***bandwidth*** and delay constraints and additionally tries to maintain traffic engineering objectives has been developed. Called LC-DCB (Least Critical-Delay Cost ***Bandwidth)*** algorithm, it has been proven to achieve performance benefits in terms of both ***bandwidth*** blocking and load distribution when compared to two other existing ***multi-constrained*** path computation algorithms. It has also been found to maintain network costs within 5% of the optimal cost under high load conditions. Based on these results, LC-DCB qualifies as an efficient TE ***multi-constrained*** path computation algorithm. (14 refs).

Descriptors

bandwidth-allocation; delays; ***multiprotocol-label-switching;*** quality- of-service; routing-protocols; telecommunication-congestion-control; telecommunication-network-routing; telecommunication-traffic.

Keywords

multiconstrained path computation algorithm; traffic engineering; ***bandwidth;*** delay; QoS; LC DCB; TAMCRA; MPLS networks; quality of service; Least Critical Delay Cost ***Bandwidth.***

Classification codes

B6150P (Communication network design, planning and routing).
B6150M (Protocols).
B6150C (Communication switching).
C5640 (Protocols).

Copyright statement

Proceedings of the 2001 International Symposium on Performance Evaluation of Computer and Telecommunication Systems.

Accession number & update

7547642, B2003-04-0100-013, C2003-04-0000-026; 20030310.

Author(s)

Ed. by Obaidat-M-S; Davoli-F.

Source

Proceedings of the 2001 International Symposium on Performance Evaluation of Computer and Telecommunication Systems, Orlando, FL, USA, 15-19 July 2001.
Sponsors: Soc. Modeling & Simulation Int.
Published: Soc. Modeling & Simulation Int, San Diego, CA, USA, xiii +634 pp, 2001.

ISSN

ISBN: 1-56555-240-7.

Publication year

2001.

Language

EN.

Publication type

CPR Conference Proceedings.

Abstract

The following topics are dealt with: multicast protocols; satellite systems; flow and congestion control; interconnection networks; distributed systems; performance modeling and measurements; high-speed networks; software tools and performance; ***multiprotocol*** labeling switch networks; traffic modeling and ***bandwidth*** estimations; scheduling; object-oriented models and architectures; multiservice network planning; asynchronous transfer mode; quality-of-service; wireless networks; transport control protocols; and algorithms.

Descriptors

asynchronous-transfer-mode; ***bandwidth-allocation;*** distributed-programming; multicast-protocols; multiprocessor-interconnection-networks; ***multiprotocol-label-switching;*** object-oriented-programming; optimisation; performance-evaluation; quality-of-service; satellite-communication; scheduling; telecommunication-congestion-control; telecommunication-network-routing; telecommunication-traffic; transport-protocols.

Keywords

multicast protocols; satellite networks; flow control; congestion control; interconnection networks; distributed systems; performance modeling; high speed networks; software tools; ***multiprotocol*** label switching; telecommunication traffic; ***bandwidth*** estimation; scheduling; object oriented modeling; multiservice network planning; asynchronous transfer mode; quality of service; wireless networks; transport control protocols; algorithms; MPLS; QoS; TCP; ATM.

Classification codes

B0100 (General electrical engineering topics).
B6150 (Communication system theory).
B6210 (Telecommunication applications).
B6250 (Radio links and equipment).
C0000 (General and ***management*** topics).
C5470 (Performance evaluation and testing).
C5670 (Network performance).
C6100 (Software techniques and systems).

Copyright statement

Dynamic resource *allocation* in QoS-enabled/MPLS supported virtual private networks and its Linux based implementation.

Accession number & update

7467611, B2003-01-6150M-042, C2003-01-5640-033; 20021202.

Author(s)

Yuxiao-Jia; Guerrero-M-L; Kabranov-O; Makrakis-D; Barbosa-L-O; Ed. by Kinsner-W; Sebak-A; Ferens-K.

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Sch of Inf Technol & Eng, Ottawa Univ, Ont, Canada.

Source

IEEE CCECE2002. Canadian Conference on Electrical and Computer Engineering. Conference Proceedings, vol.3, Winnipeg, Man., Canada, 12-15 May 2002.

Sponsors: Dept. Electr. & Comput. Eng., Faculty of Graduate Studies, Faculty of Eng., TRLabs, Internet Innovation Centre, NRC Inst. Biodiagnostics, APEGM, IEEE Winnipeg Sec., IEEE Canada & IEEE, Manitoba Hydro, Vansco Electron., Bristol Aerosp., Nygard Int., Norsat.

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Publication year

2002.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical; X Experimental.

Abstract

This paper describes a proposal for the support of quality of service over virtual private networks (VPN). We combine DiffServ, MPLS and a dynamic resource ***allocation*** technique in order to provide a QoS-enabled VPN. We apply dynamic resource ***allocation*** using traffic predictors. Our predictor assumes that the statistical behavior of ***aggregate*** traffic streams is statistically described through alpha - stable long-range dependent stochastic processes. This is a valid assumption, since some of the authors of this work proved in the past that such distributions more accurately describe ***aggregate*** traffic passing through modern networks as compared to earlier models. In our work, we investigate a scenario in which the service provider establishes service level agreements (SLA) with the customers, where the resources and QoS requirements are defined. When operating the network, the provider uses dynamic resource ***allocation*** algorithms to pace and forward traffic while optimizing the resource utilization. The conceptual architecture of this technology is provided along with a description of our Linux-based experimental testbed. We also discuss some important performance considerations obtained through extensive computer simulations. (12 refs).

Descriptors

bandwidth-allocation; Internet; ***multiprotocol-label-switching;*** operating-systems-computers; quality-of-service; ***resource-allocation;*** stochastic-processes; telecommunication-network-routing; telecommunication-traffic; virtual-private-networks.

Keywords

dynamic resource ***allocation;*** QoS enabled VPN; MPLS; virtual private networks; Linux implementation; quality of service; DiffServ; traffic predictors; statistical behavior; ***aggregate*** traffic streams; service level agreements; traffic forwarding; optimization; SLA; alpha stable stochastic processes; long range dependency; performance; Internet.

Classification codes

B6150M (Protocols).
B6150P (Communication network design, planning and routing).
B0240Z (Other topics in statistics).
B6210L (Computer communications).
C5640 (Protocols).
C1140Z (Other topics in statistics).

C6150N (Distributed systems software).

Efficient resource *allocation* in self-healing *multiprotocol* label switching mesh networks.

Accession number & update

7306644, B2002-08-6150M-024, C2002-08-5640-016; 20020626.

Author(s)

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Source

GLOBECOM '01. IEEE Global Telecommunications Conference, vol.4, San Antonio, TX, USA, 25-29 Nov. 2001.
In: p.2671-5 vol.4, 2001.

ISSN

ISBN: 0-7803-7206-9, CCCC: 0-7803-7206-9/01/ ($17.00).

Availability

Also available on CD-ROM in PDF format.

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

This paper presents a restoration scheme to minimize spare ***bandwidth reservation*** of ***bandwidth*** guaranteed paths that can recover 100% from single failure in MPLS mesh networks. Our new algorithm establishes multiple backup LSP for each primary LSP while backup LSP are multiplexed efficiently to reduce the resource ***reserved*** for backup LSP. The new scheme has several advantages compared with current work: the overall resource requirements for backup paths are reduced by about 20% to 30%; it balances the network resource utilization during the backup path ***reservation*** stage, it also balances the network load at path switchover stage. The new algorithm can admit more ***bandwidth*** guaranteed flows and it can improve the survivability of the networks. It can recover from multiple link failures when it is used with admission control. We extend the RSVP ***protocol*** to support our path restoration scheme in MPLS networks. We present the procedures to setup the backup paths, perform label binding and ***reserve*** backup resources. Explicit notification is utilized to improve the response time of network failover. (7 refs).

Descriptors

bandwidth-allocation; computer-network-reliability; Internet; multiplexing; network-topology; protocols; quality-of-service; telecommunication-traffic.

Keywords

restoration scheme; minimization; spare ***bandwidth reservation;*** network load balancing; path switchover; ***bandwidth*** guaranteed flows; survivability; multiple link failures; RSVP ***protocol;*** label binding; explicit notification; resource ***allocation;*** self healing mesh networks; ***multiprotocol*** label switching; MPLS mesh networks; IP network; QoS; multiple backup LSP; multiplexing; label switched paths.

Classification codes

B6150M (Protocols).
B6210L (Computer communications).
B6150C (Communication switching).
C5640 (Protocols).
C5620W (Other computer networks)

Path selection and *bandwidth allocation* in MPLS networks: a non-linear programming approach.

Accession number & update

7269573, B2002-06-6150M-084, C2002-06-5640-068; 20020520.

Author(s)

Burns-J-E; Ott-T-J; de-Kock-J-M; Krzesinski-A-E.

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Telcordia Technol Inc, Morristown, NJ, USA.

Source

Internet Performance and Control of Network Systems II, Denver, CO, USA, 21-22 Aug. 2001.
Sponsors: SPIE.
In: Proceedings-of-the-SPIE-The-International-Society-for-Optical-Engineering (USA), vol.4523, p.15-26, 2001.

CODEN

PSISDG.

ISSN

ISSN: 0277-786X, CCCC: 0277-786X/01/ ($15.00).

Availability

SICI: 0277-786X(2001)4523L.15:PSBA; 1-0.

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper, J Journal Paper.

Treatment codes

T Theoretical or Mathematical; X Experimental.

Abstract

Multi-protocol label switching extends the IPv4 destination-based routing protocols to provide new and scalable routing capabilities in connectionless networks using relatively simple packet forwarding mechanisms. MPLS networks carry traffic on virtual connections called label switched paths. This paper considers path selection and ***bandwidth allocation*** in MPLS networks in order to optimize the network quality of service. The optimization is based upon the minimization of a nonlinear objective function which under light load simplifies to OSPF routing with link metrics equal to the link propagation delays. The behavior under heavy load depends on the choice of certain parameters: It can essentially be made to minimize maximal expected utilization, or to maximize minimal expected weighted slacks (both over all links). Under certain circumstances it can be made to minimize the probability that a link has an instantaneous offered load larger than its transmission capacity. We present a model of an MPLS network and an algorithm to find and capacitate optimal LSP. The algorithm is an improvement of the well-known flow deviation nonlinear programming method. The algorithm is applied to compute optimal LSP for several test networks carrying a single traffic class. (10 refs).

Descriptors

bandwidth-allocation; Internet; minimisation; nonlinear-programming; packet-switching; probability; quality-of-service; telecommunication-network-routing; telecommunication-traffic; transport-protocols.

Keywords

path selection; ***bandwidth allocation;*** MPLS networks; nonlinear programming; ***multi protocol*** label switching; IPv4; destination based routing protocols; scalable routing; connectionless networks; packet forwarding; virtual connections; label switched paths; quality of service; minimization; nonlinear objective function; OSPF routing; link propagation delays; traffic load; maximal expected utilization; minimal expected weighted slacks; probability; transmission capacity; LSP; Internet ***protocol***

Classification codes

B6150M (Protocols).
B6150P (Communication network design, planning and routing).
B0260 (Optimisation techniques).
B6210L (Computer communications).
B0240Z (Other topics in statistics).
C5640 (Protocols).
C1180 (Optimisation techniques).
C5620W (Other computer networks).
C1140Z (Other topics in statistics).

The design of optimal *multi-service* MPLS networks.

Accession number & update

7173612, B2002-03-6150P-015, C2002-03-5670-007; 20020211.

Author(s)

Arvidsson-A; Krzesinski-A.

Source

Telektronikk (Norway), vol.97, no.2-3, p.116-29, 2001. , Published: Telenor Communications AS.

CODEN

TKTKAW.

ISSN

ISSN: 0085-7130.

Availability

SICI: 0085-7130(2001)97:2/3L.116:DOMS; 1-B.

Publication year

2001.

Language

EN.

Publication type

J Journal Paper.

Treatment codes

P Practical; T Theoretical or Mathematical.

Abstract

Multiprotocol label switching (MPLS) extends the IP destination-based routing protocols to provide new and scalable routing capabilities in connectionless networks using relatively simple packet forwarding mechanisms. MPLS networks carry traffic ***aggregates*** on virtual connections called label switched paths (LSP). The first part of this paper examines under what circumstances it is advantageous to design dedicated LSP for individual origin-destination pairs and service classes. We show that separate LSP in most realistic cases are likely to be the preferred mode of operation. We next consider path selection and ***bandwidth allocation*** in ***multi-service*** MPLS networks in order to optimise the overall network quality of service. The optimisation is based upon the constrained optimisation of a nonlinear objective function. We present a model of an MPLS network and a computationally efficient algorithm called XFG to find and capacitate optimal LSP. The algorithm is based on a ***bandwidth*** market where ***bandwidth*** prices determine the ***allocation*** of ***bandwidth*** to LSP. The XFG algorithm is applied to compute optimal LSP for a 55 node network model carrying 6 service classes. The results above are limited to service classes typically supported by UDP, eg, conversational voice and streaming video, where the notation of equivalent ***bandwidth*** can be applied. This is, however, not the case for service classes typically supported by TCP, eg, interactive or background data, because of the responsiveness of the ***protocol.*** We therefore extend our work to incorporate these types of traffic and apply the XFG algorithm to compute optimal LSP for a network of 8 nodes and 2 service classes. Finally we use core networks of third-generation cellular mobile systems as an example to show how the method can be generalised to any ***multi-service*** network and we also discuss how to include virtual private

Descriptors

bandwidth-allocation; cellular-radio; Internet; nonlinear-functions; optimisation; packet-switching; protocols; quality-of-service; telecommunication-network-routing; telecommunication-traffic.

Keywords

multiprotocol label switching; MPLS; IP routing protocols; scalable routing; connectionless networks; packet forwarding; traffic ***aggregates;*** virtual connections; label switched paths; service classes; origin destination pairs; path selection; ***bandwidth allocation;*** quality of service; constrained optimisation; nonlinear objective function; XFG algorithm; ***bandwidth*** prices; UDP; conversational voice; streaming video; equivalent ***bandwidth;*** TCP; interactive data; background data; third generation cellular systems; mobile systems; virtual private networks.

Classification codes

```
B6150P    (Communication network design, planning and routing).
B6150M    (Protocols).
B6210L    (Computer communications).
B6150C    (Communication switching).
B6250F    (Mobile radio systems).
C5670     (Network performance).
C5640     (Protocols).
C5620W    (Other computer networks).
```

A review of quality of service mechanisms in IP-based networks- integrated and differentiated services, *multi-layer* switching, MPLS and traffic engineering.

Accession number & update

7149718, B2002-02-6210L-116, C2002-02-5620W-065; 20020122.

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Source

Computer-Communications (Netherlands), vol.25, no.1, p.100-8, 1 Jan. 2002. , Published: Elsevier.

CODEN

COCOD7.

ISSN

ISSN: 0140-3664, CCCC: 0140-3664/02/ ($22.00).

Availability

SICI: 0140-3664(20020101)25:1L.100:RQSM; 1-#.

Publication year

2002.

Language

EN.

Publication type

J Journal Paper.

Treatment codes

P Practical.

Abstract

ISPs are facing the challenge of offering improved quality of service (QoS) to their customers. No longer is best effort delivery with no service guarantee acceptable for many applications. Although ATM has provided a limited solution by way of service classes, such a solution pre-supposed an underlying ATM network which-in the case of pure IP traffic-may not be the case. Rather IP traffic requires a degree of engineering into service classes (differentiated services, DiffServ) as well as a break from traditional layer three-based routing. Although access to virtually unlimited ***bandwidth*** via WDM and Photonic Networks may potentially

and using a label switching technique is seen as an appropriate medium term solution. Further, label switching offers a simple and efficient mechanism for IP traffic engineering, ***multi-service*** functionality and scalability. This paper examines a number of service classifications and solutions, which aim to provide a realistic QoS solution. In particular it addresses Integrated and DiffServ, ***multi-layer*** switching and MPLS, which forms the basis of DiffServ as it allows ISPs to deliver new services not easily supportable by conventional IP routing infrastructure. Finally the paper makes some important observations about traffic engineering. (32 refs).

Descriptors

Internet; quality-of-service; telecommunication-traffic.

Keywords

ISPs; QoS; ATM; IP traffic; differentiated services; DiffServ; integrated services; IntServ; ***bandwidth manager; multi*** layer switching; MPLS; ***multi protocol*** label switching; traffic engineering.

Classification codes

B6210L (Computer communications).
C5620W (Other computer networks).
C6150N (Distributed systems software).

Dynamic partitioning of link *bandwidth* in IP/MPLS networks.

Accession number & update

7113510, B2002-01-6210L-162, C2002-01-5620W-096; 20011203.

Author(s)

Rakocevic-V; Griffiths-J-M; Cope-G.

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Source

Proceedings of International Conference on Communications, vol.9, Helsinki, Finland, 11-14 June 2001. In: p.2918-22 vol.9, 2001.

ISSN

ISBN: 0-7803-7097-1, CCCC: 0 7803 7097 1/2001/ ($10.00).

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

P Practical; T Theoretical or Mathematical.

Abstract

Bandwidth allocation in the future multiservice global communication IP network presents a very interesting research issue. This paper presents the strategy of dynamic partitioning of link ***bandwidth*** in IP networks. In the dynamic partitioning scheme the ***bandwidth*** of each link in the network is partitioned into two fractions, one for the low-priority data traffic, and one for the high-priority stream (real-time) traffic. The partitioning is defined by the partitioning parameter, which changes according to the traffic profile and intensity. An algorithm for the change of partitioning parameter is presented. The evaluation of the scheme is done based on a new metric, the connection utility, which is the measurement of the average end-user utility. Based on this measurement, the dynamic partitioning scheme is compared to several other ***bandwidth allocation*** schemes. Simulation results on a single link network model show the advantage of the dynamic link partitioning. Furthermore, the paper discusses the use of ***multiprotocol*** label switching (MPLS) architecture for the implementation of the dynamic partitioning scheme. (8 refs).

Descriptors

Keywords

dynamic partitioning; link ***bandwidth;*** IP MPLS networks; ***bandwidth allocation;*** future multiservice global communication IP network; low priority data traffic; high priority stream traffic; real time traffic; partitioning parameter; connection utility; average end user utility; simulation results; single link network model; ***multiprotocol*** label switching; MPLS architecture; Internet.

Classification codes

B6210L (Computer communications).
B6150M (Protocols).
C5620W (Other computer networks).
C5640 (Protocols).

Dynamic routing of locally restorable *bandwidth* guaranteed tunnels using *aggregated* link usage information.

Accession number & update

7061998, B2001-11-6150P-037; 20011015.

Author(s)

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Source

Proceedings IEEE INFOCOM 2001. Conference on Computer Communications. Twentieth Annual Joint Conference of the IEEE Computer and Communications Society, vol.1, Anchorage, AK, USA, 22-26 April 2001.
Sponsors: IEEE Comput. Soc. IEEE Commun. Soc.
In: p.376-85 vol.1, 2001.

ISSN

ISBN: 0-7803-7016-3, CCCC: 0 7803 7016 3/2001/ ($10.00).

Publication year

2001.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

T Theoretical or Mathematical.

Abstract

We consider a new QoS routing problem which requires the on-line routing of a ***bandwidth*** guaranteed path along with the setting up of bypass paths for every link or node traversed by the primary active path. The bypass paths are used for fast local restoration where upon a link or node failure, the first upstream node re-establishes path continuity (with ***bandwidth*** guarantees) by switching to the bypass path for the failed node or link, The routing objective is to minimize the ***bandwidth*** usage for each connection so as optimize use of network resources while protecting against single node or link failure. ***Bandwidth*** efficiency is achieved by exploiting the potential for inter-demand and intra-demand backup ***bandwidth*** sharing. We develop a new algorithm for this routing problem which only uses ***aggregated*** link usage information (total ***bandwidth*** consumed on each link by active paths, total ***bandwidth*** consumed on each link by backup paths, and the residual bandwidths) that is easily obtainable by proposed routing ***protocol*** extensions. We show that the algorithm performs well in terms of the number of rejected requests and the total ***bandwidth*** used, The main use of this algorithm is for MPLS network routing and for wavelength routing in optical networks with wavelength conversion. (12 refs).

Descriptors

optical-fibre-networks; protocols; quality-of-service; telecommunication-network-reliability; telecommunication-network-routing.

Keywords

dynamic routing; locally restorable ***bandwidth*** guaranteed tunnels; ***aggregated*** link usage information; MPLS; ***multi protocol*** label switching; dynamic provisioning; ***bandwidth*** guaranteed paths; wavelength paths; backup paths; service provider requirement; resource utilization; sharing performance; traffic engineering extensions; routing protocols; shortest path computations.

Classification codes

B6150P (Communication network design, planning and routing).
B6150M (Protocols).
B6260F (Optical fibre networks).

A *management* and control architecture for providing IP differentiated services in MPLS-based networks.

Accession number & update

6935041, B2001-07-6210C-013, C2001-07-5620W-008; 20010528.

Author(s)

Trimintzios-P; Andrikopoulos-I; Pavlou-G; Flegkas-P; Griffin-D; Georgatsos-P; Goderis-D; T-Joens-Y; Georgiadis-L; Jacquenet-C; Egan-R.

Author affiliation

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Source

IEEE-Communications-Magazine (USA), vol.39, no.5, p.80-8, May 2001. , Published: IEEE.

CODEN

ICOMD9.

ISSN

ISSN: 0163-6804, CCCC: 0163-6804/2001/ ($10.00).

Availability

SICI: 0163-6804(200105)39:5L.80:MCAP; 1-U.

Publication year

2001.

Language

EN.

Publication type

J Journal Paper.

Treatment codes

A Application; P Practical.

Abstract

As the Internet evolves toward the global multiservice network of the future, a key consideration is support for services with guaranteed quality of service. The proposed differentiated services framework is seen as the key technology to achieve this. DiffServ currently concentrates on control/data plane mechanisms to support QoS, but also recognizes the need for ***management*** plane aspects through the ***bandwidth*** broker. In this article we propose a model and architectural framework for supporting DiffServ-based end-to-end QoS in the Internet, assuming underlying MPLS-based explicit routed paths. The proposed integrated ***management*** and control architecture will allow providers to offer both quantitative and qualitative services while optimizing the use of underlying network resources. (10 refs).

computer-network-management; Internet; quality-of-service; telecommunication-control; telecommunication-network-routing; transport-protocols.

Keywords

IP differentiated services; MPLS based networks; Internet; global multiservice network; guaranteed quality of service; differentiated services; QoS; ***bandwidth*** broker; DiffServ based end to end QoS; MPLS based explicit routed paths; integrated ***management*** control architecture; quantitative services; qualitative services; network resources; ***multiprotocol*** label switching.

Classification codes

B6210C (Network ***management***).
B6150M (Protocols).
B6210L (Computer communications).
B6150P (Communication network design, planning and routing).
C5620W (Other computer networks).
C5640 (Protocols).

Copyright statement

On the cost of using MPLS for interdomain traffic.

Accession number & update

6900036, B2001-05-6210L-170, C2001-05-5620W-096; 20010401.

Author(s)

Uhlig-S; Bonaventure-O; Ed. by Crowcroft-J; Roberts-J; Smirnov-M-I.

Author affiliation

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Source

Quality of Future Internet Services. First COST 263 International Workshop, QofIS 2000, Berlin, Germany, 25-26 Sept. 2000.
Sponsors: GMD FOKUS, Deutsche Telekom T-Nova, Cisco Syst., Nokia, ERCIM, IST Program, Commission of the Eur. Communities.
In: p.141-52, 2000.

ISSN

ISBN: 3-540-41076-7.

Publication year

2000.

Language

EN.

Publication type

CPP Conference Paper.

Treatment codes

P Practical.

Abstract

Multi-Protocol Label Switching (MPLS) is currently heavily used inside autonomous systems for traffic engineering and VPN purposes. We study the cost of using MPLS to carry interdomain traffic by analyzing two one day traces from two different ISPs. Our study shows that a hybrid MPLS+IP solution can significantly reduce the number of LSPs and signalling operations by using MPLS for high ***bandwidth*** flows and pure IP for low ***bandwidth*** flows. However, the burstiness of the interdomain LSPs could be a problem. (8 refs).

Descriptors

bandwidth-allocation; Internet; packet-switching; protocols; signalling; telecommunication-traffic.

Keywords

MPLS cost; interdomain traffic; ***Multi Protocol*** Label Switching; autonomous systems; traffic engineering; VPN; one day traces; ISPs; hybrid MPLS IP solution; signalling operations; high ***bandwidth*** flows; pure IP; low ***bandwidth*** flows; interdomain LSP burstiness; Internet ***Protocol***

Classification codes

B6210L (Computer communications).
B6150M (Protocols).
B6150C (Communication switching).
C5620W (Other computer networks).
C6150N (Distributed systems software).
C5640 (Protocols).
C3370L (Control applications in remote signalling, dispatching and safety devices).

Multi-protocol label switching network functional description.

Accession number & update

6658724, B2000-09-6150C-021; 20000701.

Author(s)

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Source

Internet II: Quality of Service and Future Directions, Boston, MA, USA, 20-21 Sept. 1999.
Sponsors: SPIE.
In: Proceedings-of-the-SPIE-The-International-Society-for-Optical-Engineering (USA), vol.3842, p.165-72, 1999.

CODEN

PSISDG.

ISSN

ISSN: 0277-786X, CCCC: 0277-786X/99/ ($10.00).

Availability

SICI: 0277-786X(1999)3842L.165:MPLS; 1-F.

Publication year

1999.

Language

EN.

Publication type

CPP Conference Paper, J Journal Paper.

Treatment codes

P Practical.

Abstract

Integrates a functional transport and control layer network architecture for ***multi-protocol*** label switching (MPLS) emphasizing traffic engineering concepts such as the specification and provisioning of end-to-end QoS service-layer agreements (SLAs). MPLS transport networks are provisioned considering administrator-defined policies on ***bandwidth allocation,*** security, and accounting techniques. The MPLS architecture consists of the transport and control layer networks. The transport layer network is concerned with configuration, packet forwarding, signaling, adaptation to higher layers and support of higher layers. The control layer network is concerned with policy configuration, ***management,*** distribution, definitions, schemas, elements, settings and enforcement. (4 refs).

Descriptors

quality-of-service; switching-networks; telecommunication-traffic; transport-protocols.

Keywords

multi protocol label switching; switching network; functional description; transport layer network; control layer network; functional network architecture; traffic engineering; specification; end to end QoS service layer agreements; service quality; transport network provisioning; administrator defined policies; ***bandwidth***

policy configuration; ***management;*** distribution; definitions; schemas; elements; settings; enforcement; flow theory.

Classification codes

B6150C (Communication switching).
B6150M (Protocols).

Copyright statement

Shaping *aggregate* LAN flows for transmission over ABR connections.

Accession number & update

6309625, B1999-09-6210L-055, C1999-09-5620L-014; 19990801.

Author(s)

Pippas-J-B; Venieris-I-S; Sanchez-Papaspiliou-J-A.

Author affiliation

Dept of Electr & Comput Eng, Athens Nat Tech Univ, Greece.

Source

European-Transactions-on-Telecommunications (Italy), vol.10, no.1, p.45-56, Jan.-Feb. 1999. , Published: AEI.

CODEN

ETTEFJ.

ISSN

ISSN: 1120-3862.

Availability

SICI: 1120-3862(199901/02)10:1L.45:SAFT; 1-R.

Publication year

1999.

Language

EN.

Publication type

J Journal Paper.

Treatment codes

P Practical.

Abstract

In the current recommendations on internetworking over non-broadcasting medium access and ***multi-protocol*** over ATM, the issues of ATM ***bandwidth allocation*** and flow control for best effort external LAN flows, forwarded to ATM connections have not been adequately addressed. We integrate the above features in the access units (i.e., bridges and routers) to smooth the bursty ***aggregate*** LAN traffic, to minimize losses due to congestion and consequently to achieve high end-to-end performance. The proposed flow control mechanism is based on the knowledge of the ***bandwidth*** available in the backbone network. ***Bandwidth*** advertising and explicit congestion notification mechanisms are provided by several network technologies such as frame relay and ATM. In the latter case the corresponding transfer capability is the available bit rate (ABR). The proposed flow control mechanism counts the frame delay in the access unit, and sends explicit feedback (backpressure) to neighboring legacy LAN sources. Explicit feedback partially absorbs the self-similar features of the LAN traffic and can extend the ABR flow control to the non-ATM legacy LAN stations. The shaping performed by the AU can be considered independent to the specific ***bandwidth*** advertising mechanism of the backbone network; in our case the ABR. In the performance results, the mechanism is shown to be efficient and adaptive to changes in the ATM available ***bandwidth*** and to a variety of LAN traffic characteristics. It is also shown that the flow control mechanism can be easily integrated in the ***protocol*** stacks currently met by today's LAN. (28 refs).

Descriptors

access-protocols; asynchronous-transfer-mode; ***bandwidth-allocation;*** LAN-interconnection; minimisation; telecommunication-congestion-control; telecommunication-traffic

Keywords

aggregate LAN flows; ABR transmission; internetworking; non broadcasting medium access; ***multi protocol*** over ATM; ***bandwidth allocation;*** flow control; access units; bursty traffic; loss minimization; end to end performance; ***bandwidth*** advertising; explicit congestion notification; available bit rate; frame delay; explicit feedback; self similar features; backbone network; ***protocol*** stacks; adaptive mechanism.

Classification codes

B6210L (Computer communications).
B6150C (Communication switching).
B6150M (Protocols).
C5620L (Local area networks).
C5640 (Protocols).